Claims:

1. A process for the preparation of elastomers, the process comprising:

polymerizing at least two monomers comprising at least one isoolefin and at least one multiolefin within a reaction medium comprising an organic diluent, and in the presence of an initiator system to form an organic medium slurry comprising elastomer, the organic diluent, and optionally residual monomers,

whereby the organic diluent comprises

48 to 52 vol.-% of methyl chloride, and

48 to 52 vol.-% 1,1,1,2-tetrafluoroethane, and

the methyl chloride and tetrafluoroethane add up to 90 to 100 vol.-% of the total volume of organic diluent.

2. The process according to claim 1, wherein the monomers comprise 80 wt.-% to 99.5 wt.-% by weight of the at least one isoolefin monomer and 0.5 wt.-% to 20 wt.-% by weight of the at least one multiolefin monomer based on the weight sum of all monomers employed.

3. The process according to claim 1, wherein the isoolefin is isobutene.

4. The process according to claim 1, wherein the multiolefin is isoprene.

5. The process according to claim 1, wherein the methyl chloride and tetrafluoroethane add up to 95 to 100 vol.-% of the total volume of the organic diluent.

6. The process according to claim 1, wherein the methyl chloride and tetrafluoroethane add up to 98 to 100 vol.-% of the total volume of the organic diluent.

7. The process according to claim 1, wherein the methyl chloride and tetrafluoroethane add up to 99.5 to 100 vol.-% of the total volume of the organic diluent.

8. The process according to claim 1, wherein the initiator system comprises at least one Lewis acid and at least one initiator.

9. The process according to claim 8, wherein:

the Lewis acid comprises methyl aluminum dibromide, methyl aluminum dichloride, ethyl aluminum dibromide, ethyl aluminum dichloride, butyl aluminum dibromide, butyl

aluminum dichloride, dimethyl aluminum bromide, dimethyl aluminum chloride, diethyl aluminum bromide, diethyl aluminum chloride, dibutyl aluminum bromide, dibutyl aluminum chloride, methyl aluminum sesquibromide, methyl aluminum sesquichloride, ethyl aluminum sesquibromide, ethyl aluminum sesquichloride or any mixture thereof; and

the initiator comprises at least one compound selected from the group consisting of water, hydrogen halides, carboxylic acids, carboxylic acid halides, sulfonic acids, sulfonic acid halides, alcohols, phenols, tertiary alkyl halides, tertiary aralkyl halides, tertiary alkyl esters, tertiary aralkyl esters, tertiary alkyl ethers, tertiary aralkyl ethers, alkyl halides, aryl halides, alkylaryl halides and arylalkylacid halides.

10. The process according to claim 9, wherein the initiator comprises hydrogen chloride, water and methanol.

11. The process according to claim 9, wherein the mole ratio of Lewis acid to initiator is from 1:5 to 100:1.

12. The process according to claim 1, wherein the polymerization is carried out at a temperature in the range of from -100° C. to 20° C.

13. The process according to claim 1, wherein the polymerization is carried out in a manner such that the organic medium slurry has a solids content of 1 to 45 wt.-%.

14. The process according to claim 1, wherein the polymerization is stopped after a monomer consumption of 5 wt.-% to 90 wt.-% of the initially employed monomers.

15. The process according to claim 1, wherein the organic medium slurry contains residual monomers and diluent, and the process further comprises at least partially removing the residual monomers of the monomer mixture and the diluent from the organic medium slurry.

16. The process according to claim 1, wherein the elastomer has a weight average molecular weight of 10 to 2,000 kg/mol.

17. The process according to claim 1, wherein the elastomer has a polydispersity of 1.5 to 4.5, as measured by the ratio of weight average molecular weight to number average molecular weight as determined by gel permeation chromatography.

18. The process according to claim 1, wherein the elastomer has a Mooney viscosity of from 30 to 60 ML 1+8 at 125° C. in accordance with ASTM D 1646.

19. An elastomer obtained by the process according to claim 1.

20. The process according to claim 1, wherein:

the isoolefin is isobutene;

the multiolefin is isoprene;

the monomers comprise 85 wt.-% to 95 wt.-% of the isobutene and 5 wt.-% to 15 wt.-% of the isoprene based on weight sum of all monomers;

whereby the methyl chloride and tetrafluoroethane add up to 99.5 to 100 vol.-% of the total volume of the organic diluent;

the initiator system comprises:

at least one Lewis acid selected from the group consisting of methyl aluminum dibromide, methyl aluminum dichloride, ethyl aluminum dibromide, ethyl aluminum dichloride, butyl aluminum dibromide, butyl aluminum dichloride, dimethyl aluminum bromide, dimethyl aluminum chloride, diethyl aluminum bromide, diethyl aluminum chloride, dibutyl aluminum bromide, dibutyl aluminum chloride, methyl aluminum sesquibromide, methyl aluminum sesquichloride, ethyl aluminum sesquibromide, ethyl aluminum sesquichloride and any mixture thereof; and

at least one initiator selected from the group consisting of water, hydrogen halides, carboxylic acids, carboxylic acid halides, sulfonic acids, sulfonic acid halides, alcohols, phenols, tertiary alkyl halides, tertiary aralkyl halides, tertiary alkyl esters, tertiary aralkyl esters, tertiary alkyl ethers, tertiary aralkyl ethers, alkyl halides, aryl halides, alkylaryl halides and arylalkylacid halides;

at a mole ratio of Lewis acid to initiator of 8:1 to 20:1; and

the polymerization is carried out at a temperature of -95° C. to -70° C., in a manner such that the organic medium slurry has a solids content of 15 to 40 wt.-%, and the polymerization is stopped after a monomer consumption of 10 wt.-% to 20 wt.-% of the initially employed monomers.